

"LITTLE GIANT" ROCK DRILLS

Ingersoll-Rand Company

11 Broadway, New York

Form No. 4003

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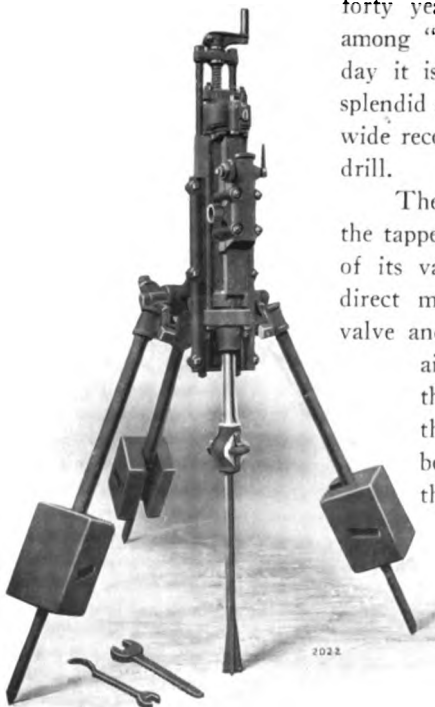
THE persistence of a machine type in continuous use over a long period and in the face of keen competition of other types is conclusive proof of the merit of that particular type. This fact being recognized, the Ingersoll-Rand "Little Giant" Rock Drill must be said to have demonstrated its superiority beyond all question.

The tappet rock drill was among the earliest successful rock drill types. The "Little Giant" was the first really successful tappet drill, and continuous improvement and development have for nearly

forty years kept it in the fore-front among "dependent valve" drills. To-day it is the finished refinement of a splendid original idea and enjoys world-wide recognition as the standard tappet drill.

The distinctive characteristic of the tappet drill is the positive character of its valve movement. There being direct mechanical connection between valve and drill piston, when steam or air is admitted to the cylinder the piston *must* move; and when the piston moves, the valve *must* be thrown, so that operation of the drill is a certainty. There

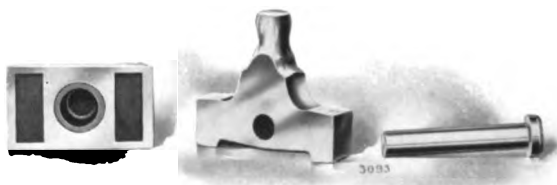
is no hesitation, no incomplete travel, no fluttering of the valve, no uncertainty in the drill operation.



The tappet action is adaptable for use with any fluid, but when applied to a rock drill the best results are obtained from compressed air or dry "live" steam. This is to be expected; and under such conditions the "Little Giant" leaves nothing to be desired in its performances. It is with "wet" steam under rather low pressure, however, that the tappet action shows its peculiar superiority. In such cases a "steam thrown" valve is slow and uncertain in action and labors under a severe burden in disposing of condensed moisture. The "Little Giant," with its positive action and large, direct passages, meets these difficulties as no other drill can; and even with such operating handicaps shows a capacity far in advance of all competitive types.

"Little Giant" Valve Movement

The "Little Giant" valve movement consists of three pieces: a valve, a rocker and a rocker pin. The rocker turns on the rocker pin and is so arranged that one or the other of its lower members is always in contact with the piston. Its upper member, ending in a globular shape, projects into the valve. When the piston moves, a curved surface slides under one of the rocker contacts, pushing the rocker upward and swinging the valve in the same direc-



"Little Giant" Valve, Rocker and Pin

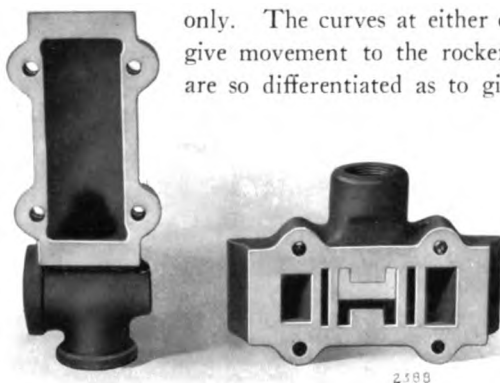
tion as the piston is moving. On the reverse travel of the piston, this series of movements is exactly reversed. The throw of the valve covers and uncovers the supply and exhaust ports. Examination of the accompanying sectional view of the "Little Giant" Drill will reveal the following very important features:

The piston does not strike the rocker. It simply slides under the rocker contact gently, and pushes it up. The curve on this portion of the piston is carefully worked out so that the movement is the easiest possible and free from shock. The line of action is such that the effort, instead of being through or against the rocker pin,

is transmitted directly to the point of contact between rocker ball and valve. This eliminates all hammering and all tendency to bind or cut on the rocker pin. The latter is simply a free support for the rocker and not in any sense a thrust bearing opposed to a hammer blow. As the result of the latest improvement in the details of this design, all movements are easy and free, and there is the lightest possible duty on rocker, valve, pin and piston. The amount of energy taken from the blow to operate the valve movement is reduced to the practical limit.

The rocker is symmetrical about the vertical axis through rocker pin and ball. This means that this part is reversible and cannot be put in place "wrong end to" by an inexperienced man. This permits also the use of a straight rocker pin instead of a taper. The holes in the cylinder for the rocker pin carries steel bushings which can be renewed when worn. These bushings work under exhaust pressure only. The curves at either end of the piston which give movement to the rocker are not identical, but are so differentiated as to give a correct distinction

between the blow and the return. The arrangement of all parts is such that a clean, sharp cut-off is secured, which is a powerful factor in the economy of the "Little Giant."

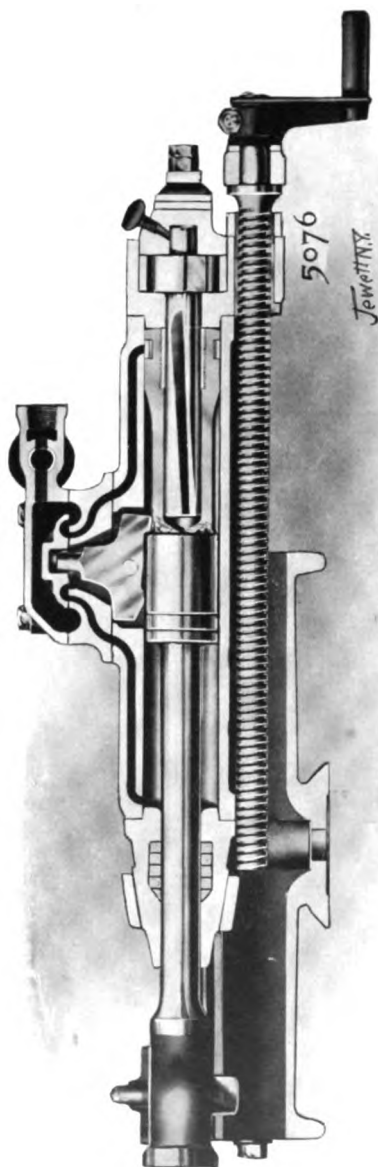


"Little Giant" Valve Chest and Seat

The valve is held to its seat by live pressure, so that wear will only improve its fit. The rocker is in a chamber open to the drill exhaust. Pressure cannot enter the cylinder except through the ports, and there can be no leakage loss from this cause. If, when the piston rings or cylinder bore are worn, there should be a leakage of pressure past the piston, this live pressure passes out from the exhaust without in any way retarding the action of the piston or reducing the force of the blow. Full stroke and full power are thus maintained under long service.

The valve movement gives the correct variation in admission

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Longitudinal Section of "Little Giant" Drill, Showing Plain Slide Valve

on the forward and return strokes, in this way economizing the steam or air. The back stroke is quick and positive, resulting in an unsurpassed "mudding" quality which adds to the cutting capacity of the "Little Giant."

The arrangement of ports and the travel of the valve are such that there is a very slight cushion on the forward stroke, enough to add "life" and speed to the blow without noticeably reducing its force. On the return stroke there is an ample cushion of exhaust steam or air which assists in the forward stroke by its expansion.

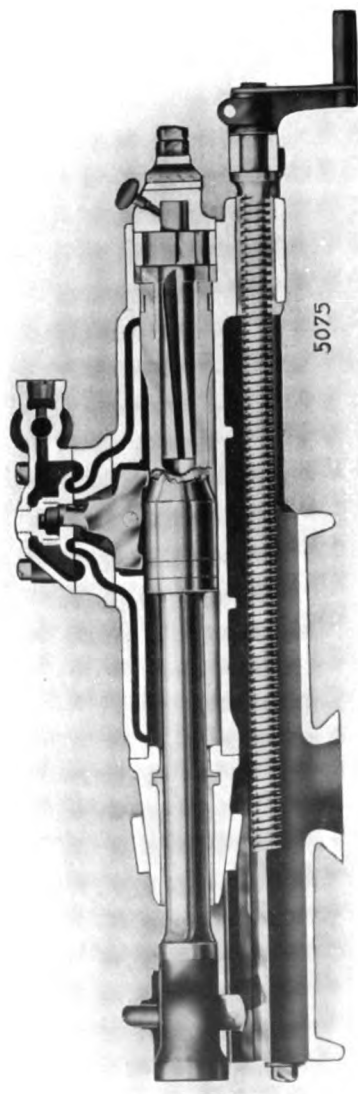
A feature of the "Little Giant" worthy of special note is the free, direct passage offered to the exhaust. Owing to this detail, no drill works off condensed steam so readily. This, combined with the positive character of the valve movement, makes the "Little Giant" unequalled as a steam driven machine, whether the steam be "wet" or "dry." It goes without saying, however, that better results always follow the use of compressed air, with its "lively" action and with the improved lubrication due to the absence of water which may wash out the oil.

The Balanced Valve

A balanced slide valve is furnished on the "Little Giant" on special order when circumstances compel the use of steam or air at unusually high pressure. With this construction the strain on the valve mechanism is reduced, the action of the machine is made more free, and wear is reduced on piston, rocker, rocker pin, valve and valve seat. The details of this balanced valve are clearly shown in the accompanying sectional illustration.

The valve is accurately ground to parallel surface on its top and bottom. The opening for the rocker ball passes entirely through the valve. A bronze plug or ring holder is screwed and riveted into the valve chest, at such a depth that it just clears the top of the valve. Surrounding this plug, and turned to a working fit upon it, is a bronze ring, bearing on its inner face a suitable packing. This ring rests upon the upper surface of the valve. When pressure is admitted to the valve chest, it acts upon the upper edge of this ring to force it downward on the valve. The space between the plug and the ring is open to the atmosphere through the exhaust. The area of the valve which is covered by the ring is about 80 per

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Longitudinal Section of "Little Giant" Drill, Showing Balanced Slide Valve

cent. of the valve area ordinarily exposed to working pressure. This valve movement is, therefore, 80 per cent. balanced and the friction between valve and seat is reduced in this proportion, easing the entire movement and reducing the wear on all parts involved.

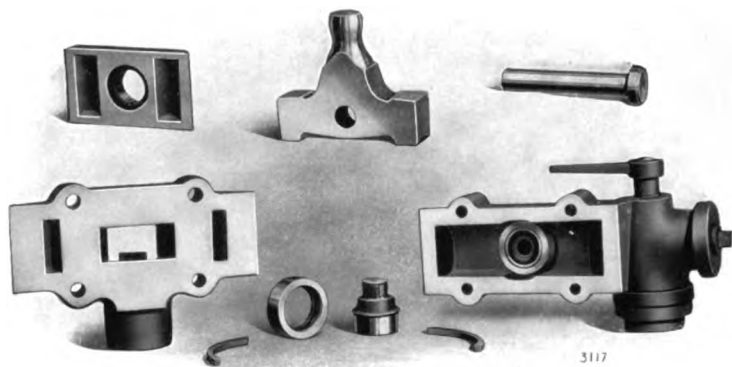
This is essentially a special device, recommended only where such high pressures are used as, in an ordinary type of valve, would throw undue strain upon the drill and mechanism. For ordinary services it is not advised, since it calls for an added number of parts and joints, each of which (in a rock drill probably more than in any other machine) is an added element of complication.

Valve Chest and Valve Movement

The selection of the proper materials for the valve mechanism of the "Little Giant" has been the matter of years of study; the present practice represents a combination of the best materials at present available.



Ingersoll-Rand Drills at Work on the Site of the New Pennsylvania Railroad Terminal, New York



Parts of "Little Giant" Balanced Valve and Chest

The valve chest is a malleable casting with the throttle cast solid as a part of it. The latter is of the taper plug type, with automatic provision for wear which guards against leakage. The valve seat is a tough casting, with a shoulder which covers the rocker pin head, and prevents the latter from working out. The valve is a drop forging of high-carbon steel, machined to a perfect seat. The rocker also is a high-carbon steel, drop forging, machined and ground true. It is hardened at points of contact with the piston and valve. The ball shape at the top gives a rolling, rather than a sliding, contact with the valve. The rocker pin is of hardened high-carbon steel, locked in place as already described.

The Rotation

"Little Giant" Drills are regularly furnished with the standard "Rand" Rotation. Certain sizes, however, as designated in the table of specifications on page eleven, can be furnished on order with the "Sergeant Slip Rotation." Both of these devices are described in pamphlet 4001, which will be sent on request. The latter pamphlet also gives complete details as to materials used and methods of construction which are common to all Ingersoll-Rand drill types.

Lower Heads

Three types of lower head are offered on standard "Little Giant" Drills. As these are fully described in pamphlet 4001 it will be enough at this point to simply draw the distinctions between them.

The "Two-Bolt Split Lower Head" is adapted to either steam or air. The "Ring Lower Head" is especially intended for steam, having a special quality of steam packing. The "C and H Ring Lower Head" is a modification of the former type, designed for use with air, by substituting a cup leather for the steam packing.

Some Operating Features

Examination of the sectional illustration shows how all working parts of the "Little Giant" Drill are directly exposed to the lubricant entering through the supply pipe. No drill is better lubricated than this, and the result is a remarkably free action, exceptionally long life, and freedom from repairs.

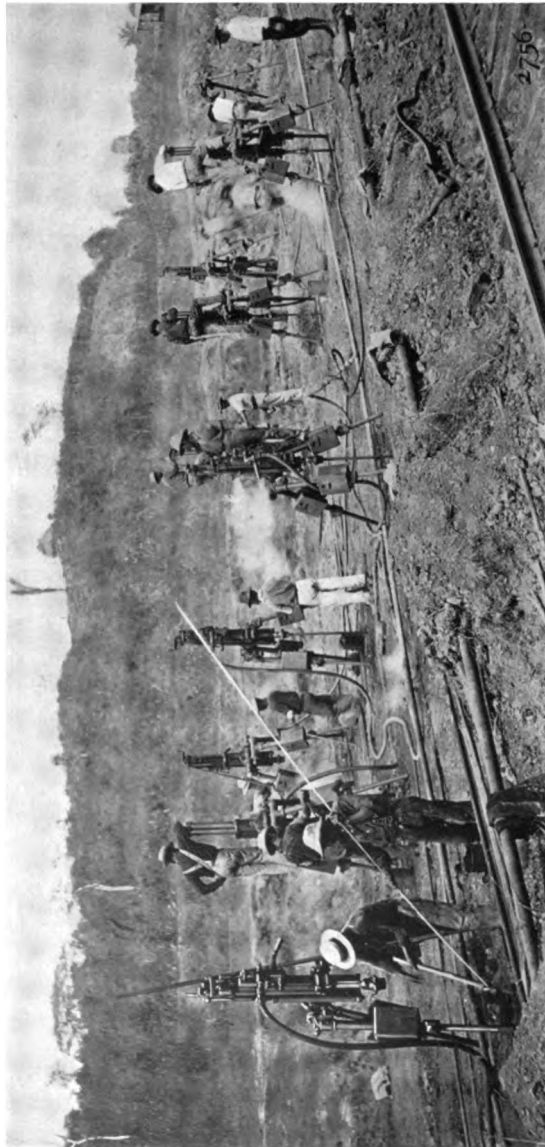
It has been said that the piston is slightly cushioned on the forward stroke. This is an advantage rather than otherwise in rock which is in any degree "springy" or elastic, where the best cutting effect cannot be secured by a dead, stunning blow. This cushion also gives the machine a "lively" action which is highly desirable.

Any tappet valve movement demands a piston travel sufficient to give the valve travel requisite to uncover the ports. This sets a limit to the stroke variation obtainable. But the design of the "Little Giant" is such as to give the necessary valve travel with a very short piston stroke. For this reason, this drill has a wider range of effective stroke than most tappet valve types. This feature secures full power and maximum cutting effect in hard, homogeneous materials free from seams, while still affording great pulling power in sheely, seamy rock or in a material with a tendency to cave and bind.

The Rand "Little Giant" Drill in its present model is the acme of simplicity and strength. Recent improvements have added to its power, economy and reliability under all conditions. It is today without doubt the most reliable and effective machine in the tappet valve class, and the most economical in operation and maintenance.

The table on page eleven gives detailed specifications as to sizes, weights and capacities of the standard "Little Giant" line. All orders should be based upon the information there given.

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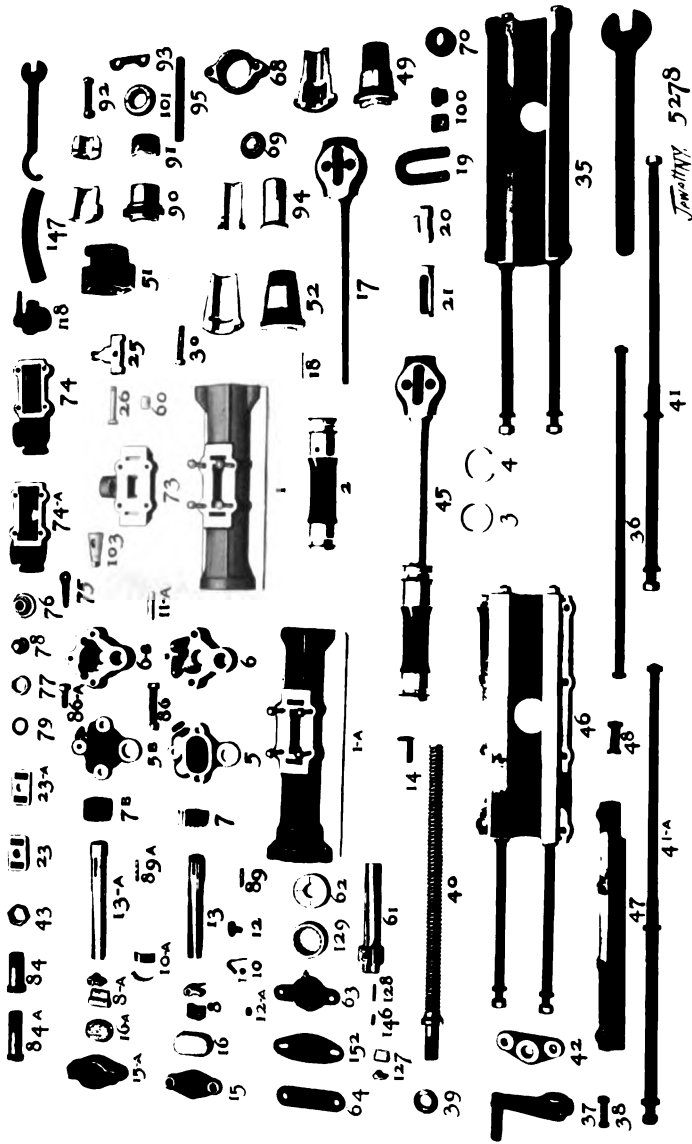
"Little Giant" Drills at Work on the Panama Canal

"LITTLE GIANT" ROCK DRILLS

DESCRIPTIVE TABLE OF "LITTLE GIANT" DRILLS										
Letter and Number Indicating Type.....	Kid Model 5	OD Model 5	1 Model 5	2A Model 5	2D Model 5	2B Model 5	3D & 3A Model 5	3B Model 5	3½D Model 5	4D Model 5
DIMENSIONS:										
Diameter of Cylinder..... in.	1½	2	2½	2½	2½	2½	3½	3½	3½	3½
Length of Stroke..... in.	3½	5½	3½	6½	6½	6½	6½	6½	6½	7½
Length of drill from end of crank to end of chuck..... in.	33½	38	39½*	40½	46½*	45½	48	48	55½	55½
Depth of hole drilled without change of bit..... in.	10	15	18	18	18	18	24	24	24	30
Diameter of supply inlet (standard pipe)..... in.	¾	¾	¾	¾	¾	¾	1	1	1	1
Approximate strokes per minute with 60 pounds pressure at drill.....	700	550	500	450	450	450	400	400	400	325
Depth of vertical hole each machine will drill easily from 1 to..... ft.	3-4	5	6	10	10	10	14	14	16	20
Diameter of holes drilled (at bottom)..... in.	1½	1	1½	1½-1¾	1½-1¾	1½-1¾	1½	1½	1½	2
Diameter of octagon steel used..... in.	1½	¾ or 7/8	¾ or 7/8	1 or 1½	1 or 1½	1 or 1½	1 or 1½	1 or 1½	1 or 1½	1½
Size of shanks (diameter and length)..... in.	¾ x 3	¾ x 5	¾ x 5	1 x 5½	1 x 5½	1 x 5½	1½ x 6	1½ x 6	1½ x 6	1½ x 6
Number of pieces in set of steels to drill holes in depths as stated.....	4	4	4	7 or 5	7 or 5	7 or 5	7	7	8	8
Best size of boiler to give plenty of steam at high pressure..... hp.	3	5	6	8	8	8	8	8	10	12
Best size of supply pipe to carry steam or air 100 to 200 feet..... in.	¾	¾	1	1½	1½	1½	1½	1½	1½	2
APPROXIMATE WEIGHTS:										
Drill unmounted, with wrenches and fittings, not boxed..... lbs.	98	118	176	227	232	220	312 3A 321 3D	290	329	459
Drill unmounted, with wrenches and fittings, boxed..... lbs.	132	152	209	268	273	261	362	340	379	520
Drill, tripod, weights and wrenches, shipping weights..... lbs.	328	348	527	769	754	762	920	889	928	1279
SHIPPING MEASUREMENTS (over all):										
Box with unmounted drill and fittings..... ft. in.	4' 1" 0"	3' 4" 0"	3' 6" 1" 0"	4' 0" 1" 0"	4' 0" 1" 0"	4' 0" 1" 0"	4' 6" 1" 0"	4' 6" 1" 0"	4' 6" 1" 0"	5' 0" 1" 1"
Box with three weights..... ft. in.	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"
Box with one length of hose..... ft. in.	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"	3' 0" 3" 0"
Prices (f. o. b. Painted Post or New York) and Telegraph Names: Drill unmounted with wrenches and fittings, without tripod or column.....										
Tripod and weights.....		\$170	\$225	\$275	\$275	\$275	\$312.50	\$312.50	\$325	\$362.50
Drill complete with tripods, weights and fittings.....		\$30	\$30	\$50	\$50	\$50	\$50	\$50	\$50	\$55

*Add one inch to this length where Inserted Pawl Rotation is used. †Length with Inserted Pawl Rotation, 55½ inches. ‡When this drill is furnished with an eighteen-inch feed, its length is 44½ inches.
 Note: Drill complete includes drill, throttle, oiler and wrenches and does not include steels, hose or blacksmith's tools; if mounted, tripod or column and wrenches are included.

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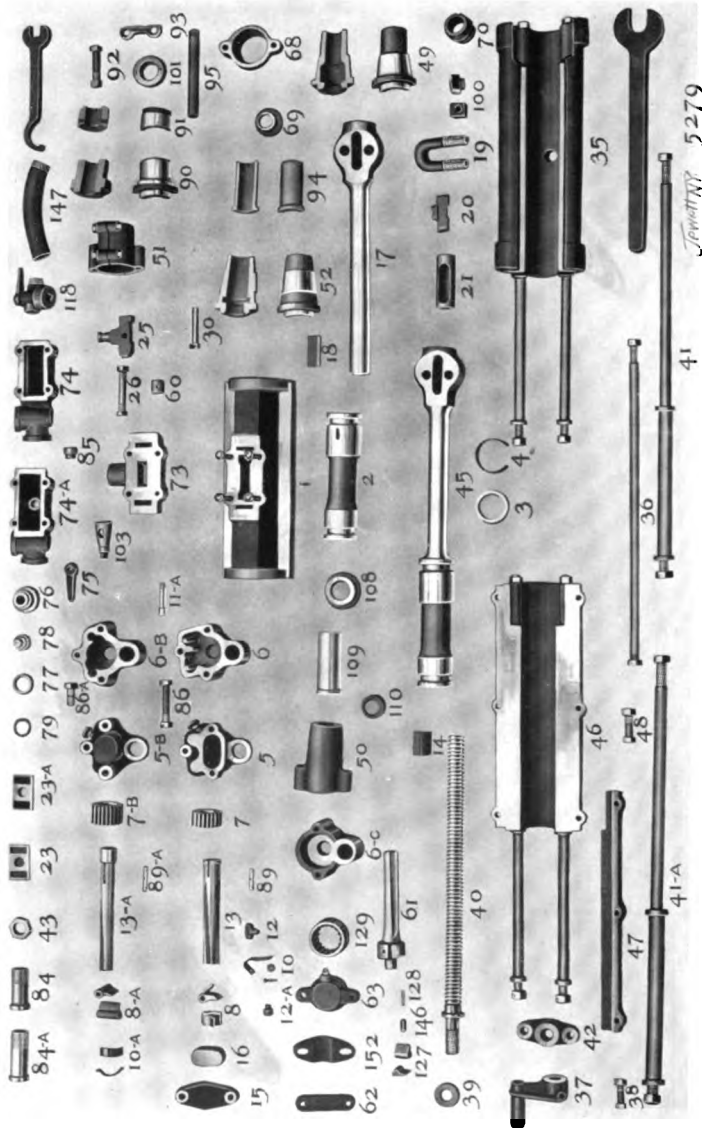
Duplicate Parts of Model 5 "Little Giant" Drills

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DUPLICATE PART LIST OF MODEL 5 "LITTLE GIANT" DRILL

Taper Chest Complete (plain valve)		41 Standard and Nut (regular and sergeant rotation)
74 Taper Steam Chest Bare		41A Standard and Nut (inserted pawl rotation)
103 Taper Throttle Plug		42 Crosshead
75 Taper Throttle Plug Handle		Shell Complete (adjustable)
76 Taper Throttle Cap		46 Shell Bare (includes standards and nuts)
23 Slide Valve (plain)		41 Standard and Nut (regular and sergeant rotations)
73 Valve Seat		41A Standard and Nut (inserted pawl rotation)
25 Rocker		47 Shell Slide
26 Rocker Pin (straight)		48 Shell Slide Bolt and Nut
Taper Chest Complete (balanced valve)		42 Crosshead
74A Taper Steam Chest Bare		Feed Screw Complete
103 Taper Throttle Plug		40 Feed Screw
75 Taper Throttle Plug Handle		39 Feed Screw Washer
76 Taper Throttle Cap		84 Feed Nut (regular and sergeant)
77 Balanced Valve Ring		84A Feed Nut (inserted pawl)
78 Balanced Valve Ring Holder		43 Jam Nut
79 Balanced Valve Ring Packing		Back Head Complete (sergeant internal)
23A Balanced Slide Valve		63 Back Head (includes oil plug)
73 Valve Seat		12 Oil Plug
25 Rocker		Upper Head Complete (regular)
26 Rocker Pin (straight)		5 Upper Head (includes oil plug)
I Cylinder Bare or Complete (includes parts 30 and 60)		12 Oil Plug
30 Steam Chest Stud and Nut		6 Ratchet Box (includes pawl studs)
60 Rocker Pin Bushing		11A Pawl Stud Plain
IA Cylinder Bare or Complete for Sergeant Internal Rotation (includes parts 30 and 60.)		86 Ratchet Box Bolt and Nut
30 Steam Chest Stud and Nut		Upper Head Complete (inserted pawl)
60 Rocker Pin Bushing		5B Upper Head (includes oil plug)
Rotation Complete (regular)		12A Oil Plug
13 Rifle Bar		6B Ratchet Box Bare
7 Ratchet		86A Ratchet Box Stud and Nut
89 Ratchet Key		C and H Ring Lower Head Complete "Air"
8 Pawl Complete (includes spring)		52 C. and H. Lower Head Bare (two pieces)
10 Pawl Spring		94 C. and H. Lower Head Bushing (two pieces)
Rotation Complete (sergeant internal)		69 Leather Packing
61 Rifle Bar		68 C. and H. Lower Head Ring
129 Rotating Ratchet		Ring Lower Head Complete "Steam or Air"
62 Rotation Washer		49 Ring Lower Head Bare (two pieces)
127 Rotation Pawl		68 Ring Lower Head Rink
146 Rotation Pawl Plunger		70 Ring Lower Head Packing
128 Rotation Pawl Spring		Two-Bolt Split Lower Head Complete "Steam"
13A Rifle Bar		Two-Bolt Split Lower Head Complete "Air"
Rotation Complete (inserted pawl)		51 Steam or Air Head Bare (includes bolts and nuts)
13A Rifle Bar		92 Steam or Air Head Bolt and Nut
7B Ratchet		90 Steam or Air Head Bushing (two pieces)
89A Ratchet Key		91 Steam or Air Head Stuffer (two pieces)
8A Pawl Bare		93 Steam or Air Head Copper Filling Piece
10A Pawl Spring		95 Steam Head Packing
Piston Complete (solid piston and chuck)		101 Air Head Split Ring
45 Piston Bare (always includes Bushing unless otherwise specified)		69 Air Head Split Ring Leather Packing
21 Chuck Bushing		Miscellaneous
3 Piston Ring		152 Cushion Spring (two pieces, for sergeant internal rotation)
4 Piston Ring Spring		64 Cushion Spring Strap (for sergeant internal rotation)
19 Chuck Bolt (without nuts)		16 Cylinder Buffer (regular)
100 Chuck Bolt Nut		15 Cylinder Buffer Yoke (regular)
20 Chuck Key		16A Cylinder Buffer (inserted pawl)
14 Rotating Nut		15A Cylinder Buffer Yoke (inserted pawl)
Piston Complete (separate piston and chuck)		147 Exhaust Pipe
2 Piston Bare (without rotating nut)		36 Cylinder Side Rod and Nut
17 Chuck Bare (always includes Bushing unless otherwise specified)		118 Oiler
21 Chuck Bushing		
18 Piston Key		
3 Piston Ring		
4 Piston Ring Spring		
19 Chuck Bolt (without nuts)		
100 Chuck Bolt Nut		
20 Chuck Key		
14 Rotating Nut		
37 Feed Handle Complete		
38 Feed Handle Bolt and Nut		
Shell Complete (solid)		
35 Shell Bare (includes standards and nuts)		

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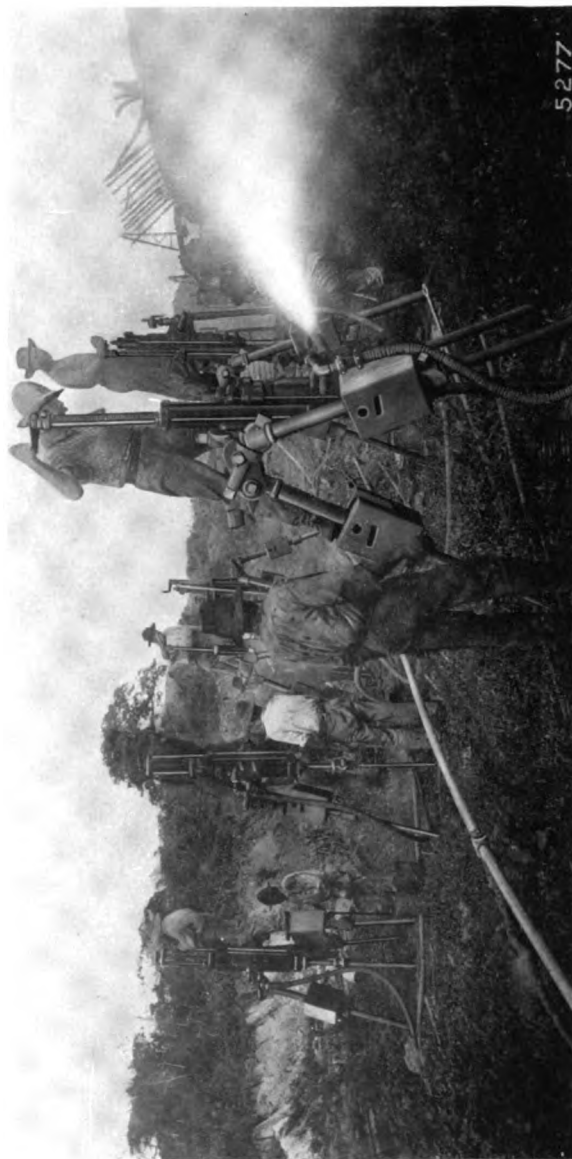
Duplicate Parts of B Type "Little Giant" Drills

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DUPLICATE PART LIST OF "B" TYPE "LITTLE GIANT" DRILL

Taper Valve Chest Complete (plain valve)	Shell Complete (adjustable)
74 Taper Chest Bare	46 Shell Bare (includes standards and nuts)
103 Taper Throttle Plug	41 Standard and Nut (regular)
75 Taper Throttle Plug Handle	41A Standard and Nut (inserted pawl)
76 Taper Throttle Cap	47 Shell Slide
23 Slide Valve	48 Shell Slide Bolt and Nut
73 Valve Seat	42 Crosshead
25 Rocker	Feed Screw Complete
26 Rocker Pin and Nut (taper)	40 Feed Screw
Taper Chest Complete (balanced valve)	84 Feed Nut (regular)
74A Taper Chest Bare	84A Feed Nut (inserted pawl)
103 Taper Throttle Plug	43 Jam Nut (regular and inserted pawl)
75 Taper Throttle Plug Handle	Back Head Complete (sergeant external)
76 Taper Throttle Cap	63 Back Head (includes oil plug)
77 Balanced Valve Ring	12 Oil Plug
78 Balanced Valve Ring Holder	6C Ratchet Box
79 Balanced Valve Ring Packing	Upper Head Complete (regular)
23A Balanced Slide Valve	5 Upper Head (includes oil plug)
25 Rocker	12 Oil Plug
26 Rocker Pin and Nut (taper)	6 Ratchet Box (includes pawl studs)
1 Cylinder Bare or Complete (includes steam chest studs and nuts)	11 Pawl Stud Threaded
30 Steam Chest Stud and Nut	86 Ratchet Box Bolt and Nut
Rotation Complete (sergeant external)	Upper Head Complete (inserted pawl)
61 Rifle Bar	5B Upper Head (includes oil plug)
129 Rotation Ratchet	12A Oil Plug
127 Rotation Pawl	6B Ratchet Box Bare
146 Rotation Pawl Plunger	86A Ratchet Box Stud and Nut
128 Rotation Pawl Plunger Spring	C and H Ring Lower Head Complete "Air"
Rotation Complete (regular)	52 Head Bare (two pieces)
13 Rotating Bar	94 Bushing (two pieces)
7 Ratchet	69 Leather Packing
89 Ratchet Key	68 Ring
8 Pawl Complete (includes part 10)	Ring Lower Head Complete "Steam or Air"
10 Pawl Spring Complete (includes rivet and washer)	49 Head Bare (two pieces)
Rotation Complete (inserted pawl)	68 Ring
13A Rotating Bar	70 Packing
7B Ratchet	Two-Bolt Split Lower Head "Steam"
89A Ratchet Key	Two-Bolt Split Lower Head "Air"
8A Pawl Bare	51 Steam or Air Head Bare (includes bolts and nuts)
10A Pawl Spring	92 Steam or Air Head Bolt and Nut
Piston Complete (solid piston and chuck)	90 Steam or Air Head Bushing (two pieces)
45 Piston Bare (includes Bushing unless otherwise specified)	91 Steam or Air Head Stuffer (two pieces)
21 Chuck Bushing	93 Steam or Air Head Copper Filling Piece
3 Piston Ring	95 Steam Head Packing
4 Piston Ring Spring	101 Air Head Split Ring
19 Chuck Bolt (without nuts)	69 Air Head Split Ring Leather Packing
100 Chuck Bolt Nut	C and H Lower Head Complete "Air"
20 Chuck Key	50 Head Bare
14 Rotating Nut	108 Ring
Piston Complete (separate piston and chuck)	109 Bushing
2 Piston Bare (without rotating nut)	110 Leather Packing
17 Chuck Bare (includes Bushing unless otherwise specified)	Miscellaneous
18 Piston Key	152 Cushion Spring (two pieces)
3 Piston Ring	62 Cushion Spring Strap
4 Piston Ring Spring	39 Feed Screw Washer
19 Chuck Bolt (without nuts)	16 Cylinder Buffer
100 Chuck Bolt Nut	15 Cylinder Buffer Yoke
14 Rotating Nut	147 Exhaust Pipe
37 Feed Handle Complete	85 Chest Plug
38 Feed Handle Bolt and Nut	36 Cylinder Side Rod and Nut
Shell Complete (solid)	
35 Shell Bare (includes standards and nuts)	
41 Standard and Nut (regular)	
41A Standard and Nut (inserted pawl)	
42 Crosshead	

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